7.06 Gas Free Engineering Program

Unit 7 at a Glance

GFE Program GFE Duties Hazardous Atmospheres	GF Inspection Hot Work CPR CERTIFICATION
Reports & Records GF Equipment Lab GF Pub Exercise	HAZMAT Tank Cleaning Sewage Safety Spray Painting
Liability Ventilation Procedures Emergency Rescue Protective Clothing Respiratory Protection	Case Study: DEATH IN A COFFERDAM Gas Free Practical*** Toxic Gas Drill Unit 7 Review Unit 7 Exam***

Enabling Objectives

- **STATE the *need* for a GFE Program**
- **STATE the *purposes* of the GFE Program**
- **EXPLAIN the contents and applicability of the various GFE *references***

- **EXPLAIN the *responsibilities* of the various levels of the chain of command**
  - **CO**
  - **DHs, DIVOs, Pos**
  - **Officers/POICS**
  - **Operating Personnel**
- **DESCRIBE the basic elements of the *GFE Program***
- **EXPLAIN the purposes of the following bills and instructions**
  - ***GFE Instruction***
  - ***Toxic Gas Bill***

- **DESCRIBE the requirements for All Hands Awareness *Training***

What is Gas Free Engineering?

- **Performing testing, evaluating, removing or controlling hazardous materials or conditions within or related to a confined space**
- **Controlling hazards to personnel entering or working in, on, or adjac**
- ***No routine hazard, with the exception of ordnance, is as dangerous as the presence of potentially lethal atmospheres in ship's spaces***

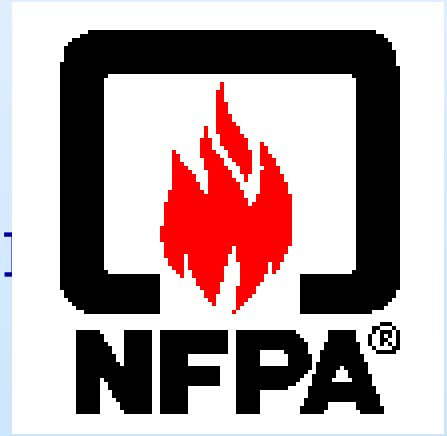
GFE History

GFE History

1941 - Navy begins using gas test equipment after deaths during Pearl Harbor salvage ops

1947 - "NFPA" formed for ship fire safety

1963 - NFPA certifies Ma
Chemists



GFE History

1965 - Vessel Explodes in Guam; CO's start designating GFE as collateral duty

*1970 - "OSHA" formed; mandates gas fre 29CFR1915 on all vessels

1982 - Formal GFE Program established by NAVSEA S6470-AA-SAF-010 "Safe 10" Manual (Later updated as NSTM 074 v 3)

GFE History

1993 - OSHA mandates permits for confined space entry in all industries & USN/USCG ships

1994 - Navy issues "NAVOSH Manual" for managing safety programs

1998 - NSTM 074 v 3 Rev 3 tightens program guidelines & introduces

Why Do We Need a Gas Free Engineering Program?

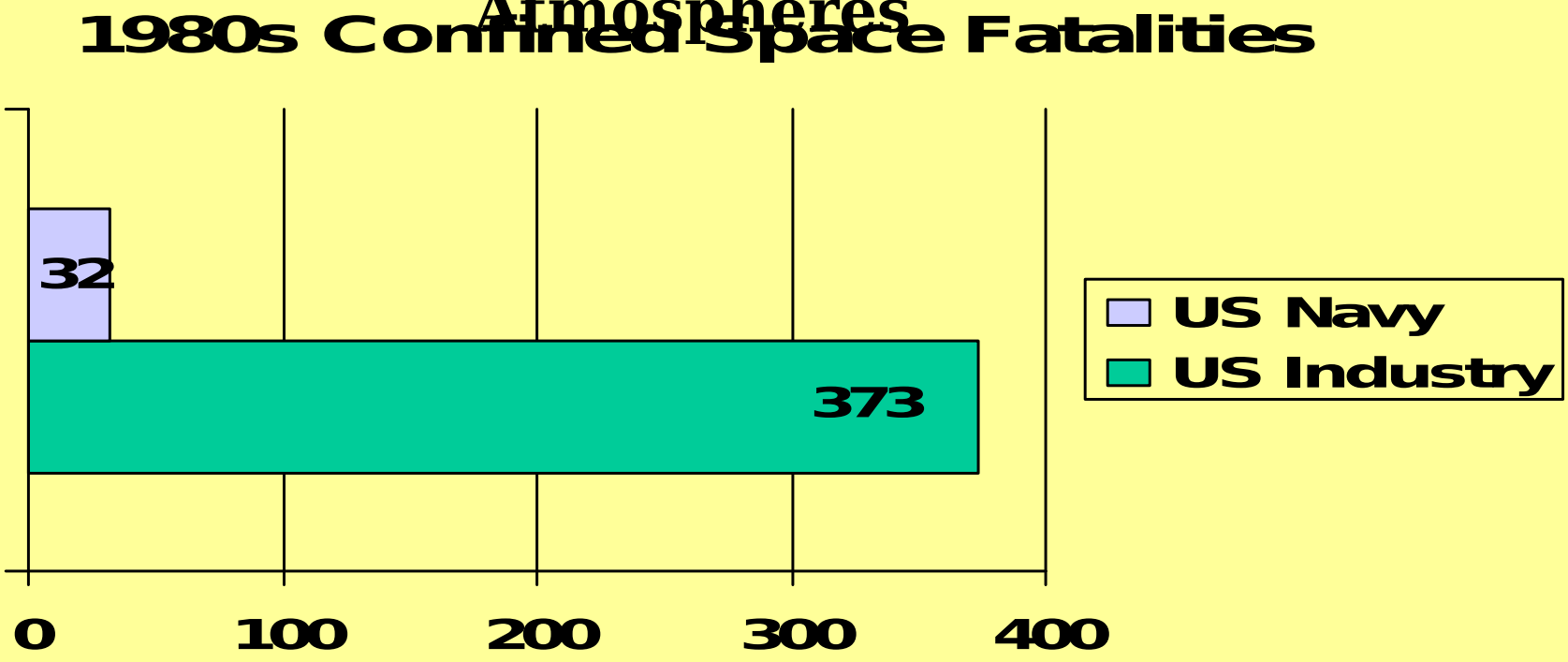
- Hazardous atmospheres may be created that can explode or cause asphyxiation
- Personnel attempting to save a fallen shipmate may become ***overcome and killed*** by undetected vapors
- For this reason, every *confined space* must be gas freed

60 %

of Casualties are Well-Intentioned

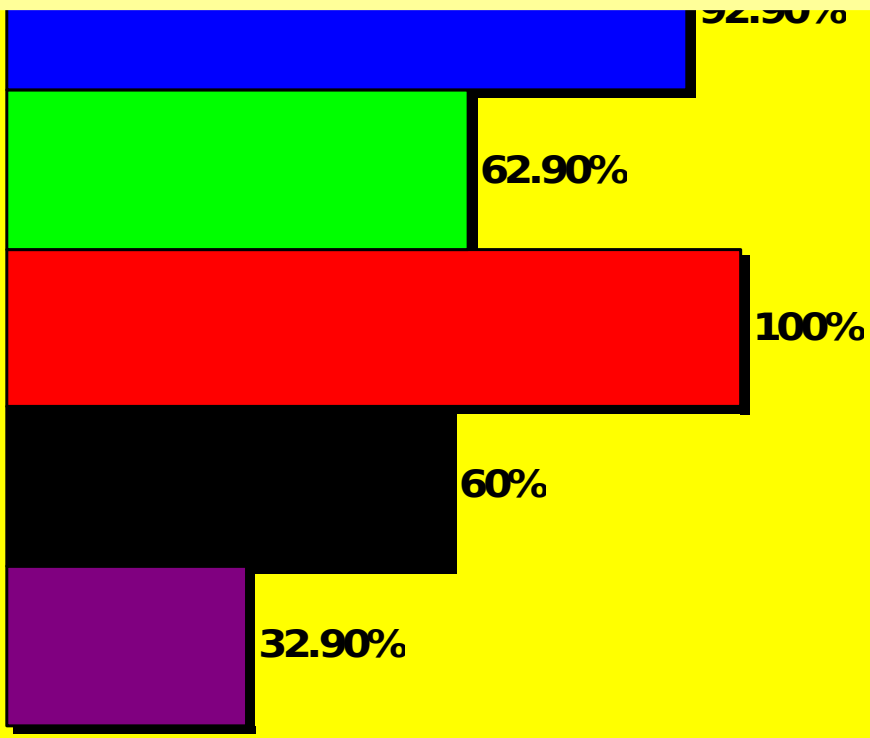
RISK MANAGEMENT

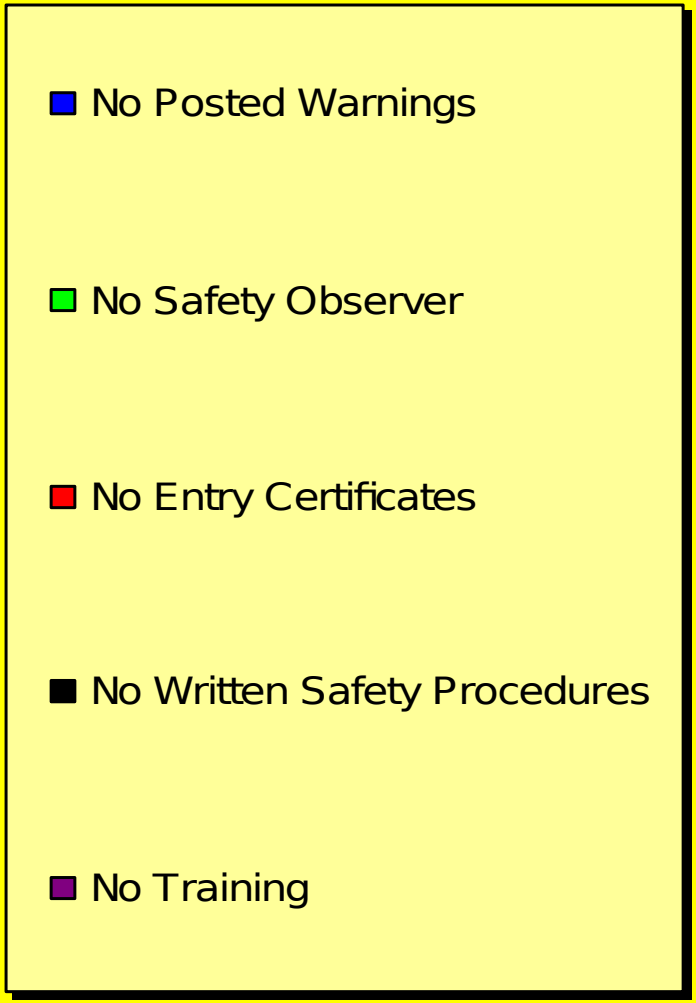
Confined Space Deaths Resulting from Hazardous Atmospheres



Navy & Civilian Industry documented numerous fatalities through the 1980's.

Investigation of 109 Confined Space Fatalities in Industry, 1983-1993

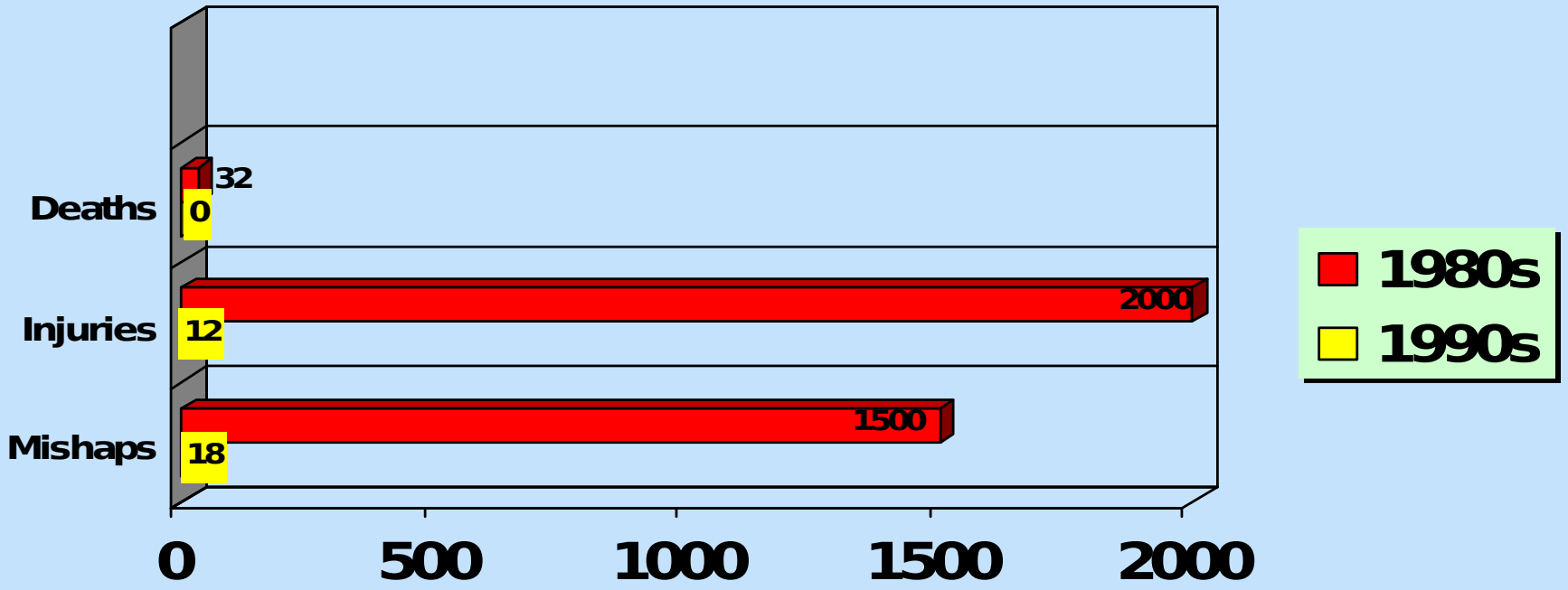




Source: NIOSH

OSHA made all these safety precautions mandatory as of

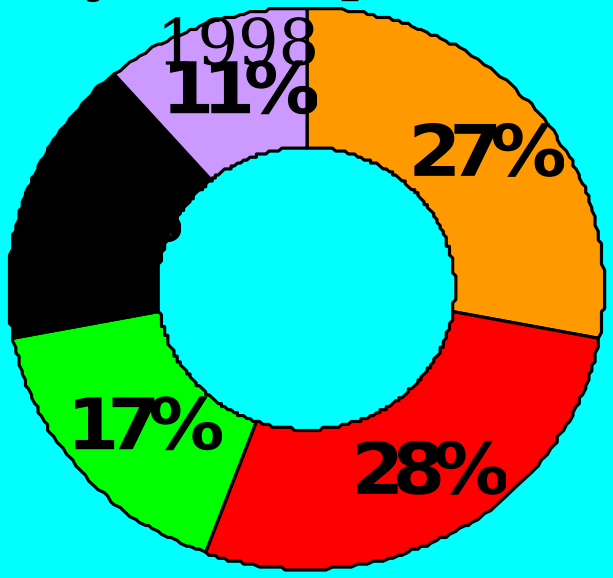
US Navy Toxic Exposure Incidents



The Navy Gas Free Program is Working ! ! !

COMMON TOXIC HAZARDS

US Navy Mishaps 1989 - 1998



Source: NAVSAFECEN

COMMON THREADS TO GFE MISHAPS

- Lack of Hazard Awareness

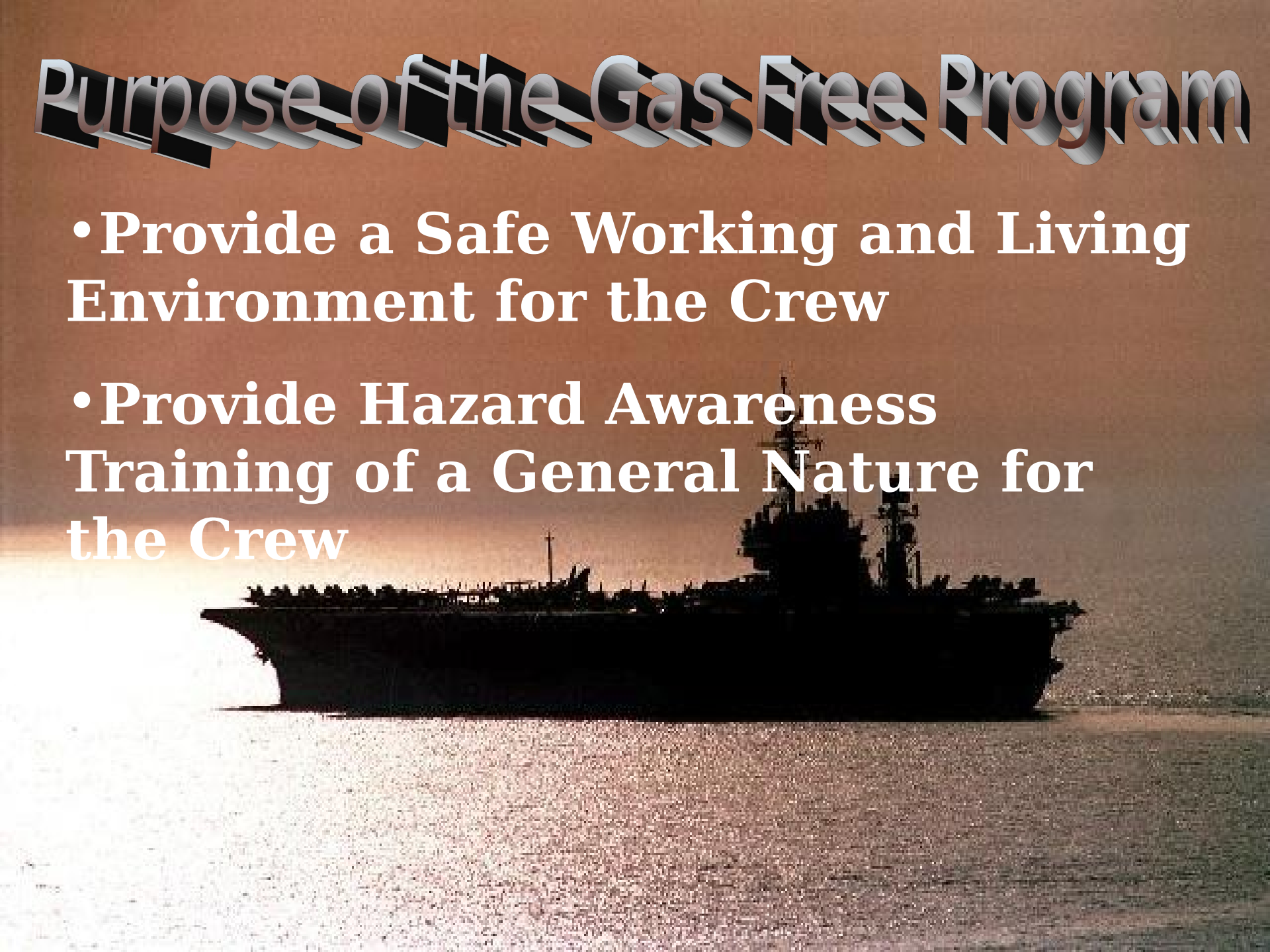
- Lack of Khaki Supervision

Why Do We Need a Gas Free Engineering Program?

- Too Little Oxygen
- Too Much Oxygen
- Combustible Atmosphere
- Toxic Atmosphere

Purpose of the Gas Free Program

- **Provide a Safe Working and Living Environment for the Crew**
- **Provide Hazard Awareness Training of a General Nature for the Crew**



Civilian References

- PL 91-5967, The Occupational Safety and Health (OSHA) Act Of 1970
- The Code of Federal Regulations (CFR)
  -- 29 CFR 1915,1916,1917 OSHA Standards

The NAVOSH Manual

- **OPNAVINST 5100.19D, Navy Occupational Safety & Health (NAVOSH) Program Manual For Forces Afloat**
  - ✔**Chapter B3** ***HAZMAT***
  - ✔**Chapter B6** ***Respiratory Protection Program***
  - ✔**Chapter B8** ***GFE Program***
  - ✔**Chapter B12** ***PPE***
  - ✔**Chapter C11** ***Welding, Cutting, Brazing***

The SORM

- OPNAVINST 3120.32 (series) Standard Organization & Regulations of the U. S. Navy
  - ✔630.17 *Tag Out Bill*
  - ✔640.1 *General Emergency Bill*
  - ✔640.8 *Toxic Gas Bill*

NSTMs

- NSTM 074 vol 1:Welding and Allied Processes (Sect. 10 Safety Precautions)
- NSTM 077: Personnel Protection Equipment (PPE) (Sect. 3 Breathing Apparatus and Equipment
- NSTM 555: Firefighting (Post Fire Gasses & Atmospheric Testing)

NSTMs

- NSTM 593: Pollution Control (Sect. 4 Sewage)
- NSTM 631: Preservation of Ships in Service (Sect. 2 Safety Information)
- NAVSEA OP 4: Ammunition Afloat (Chpt 2 General Regulations)

NSTM 074 Vol 3

- **NSTM CHAPTER 074 Vol. 3**

Gas Free Engineering

Principle Course Reference

GFE's Handbook

GAS FREE ENGINEERING RELATED ORGANIZATIONS

NFPA®

NIOSH

U.S. Department of Labor
Occupational Safety and Health Administration
OSHA

U.S. Department of Labor
MSHA
Mine Safety & Health Administration

OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA)

- US DEPT OF LABOR
- REGULATORY AGENCY WITH ENFORCEMENT AUTHORITY
- WRITES TITLE 29, CFR
- SETS PERMISSABLE EXPOSURE LIMITS (PELS) FOR TOXIC SUBSTANCES WHICH CARRY FORCE OF FEDERAL LAW

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH (NIOSH)

- **US Dept of Health & Human Services**
- **US Public Health Services**
- **Centers for Disease Control (CDC)**
- **Non-regulatory agency**
- **No enforcement authority**

- **<u>Tests & approves equipment</u>**
- **Similar to Underwriter's Lab (U/L)**
- ***Recommends toxic exposure limits to OSHA***

MINE SAFETY & HEALTH ADMINISTRATION (MSHA)

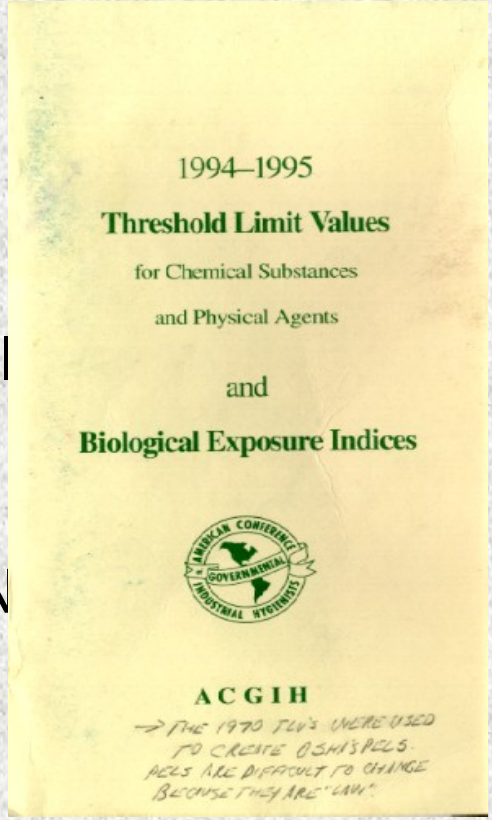
- US DEPARTMENT OF LABOR
- PERFORMS SIMILAR FUNCTION TO NIOSH
  - APPROVES RESPIRATORS
  - APPROVES PROTECTIVE CLOTHING

ACGIH® WORLDWIDE

Celebrating 60 years of outstanding service to occupational and environmental health and safety!

AMERICAN CONFERENCE OF GOVERNMENT INDUSTRIAL HYGIENISTS (ACGIH)

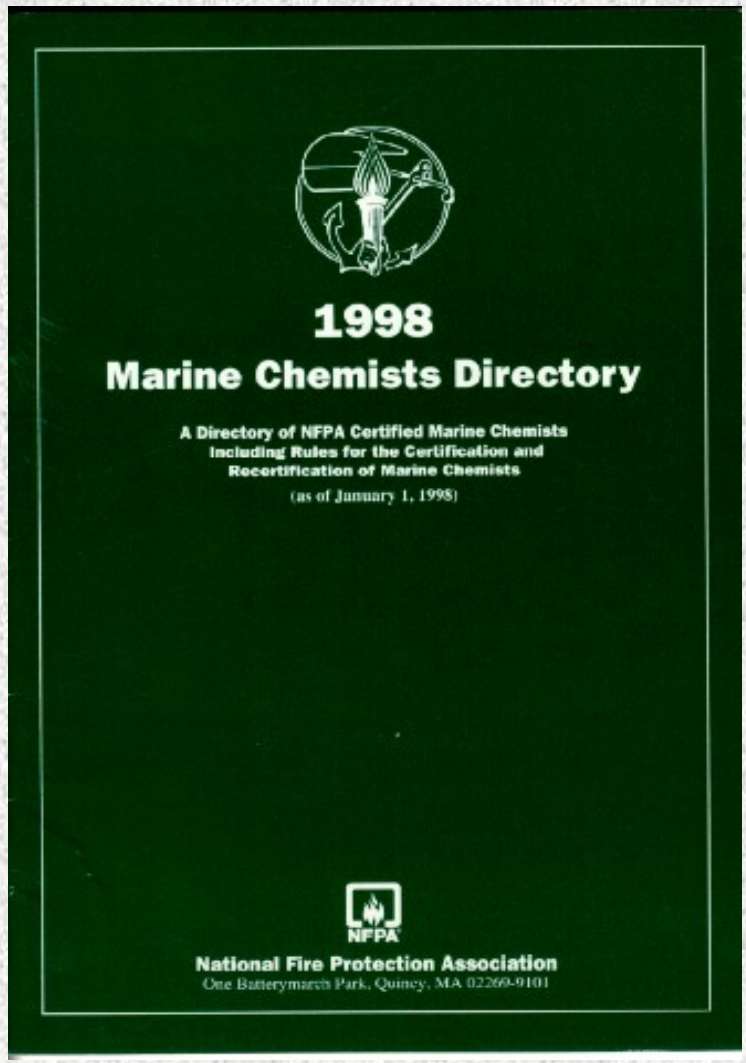
- PROFESSIONAL SOCIETY
  - NOT GOVERNMENT AGENCY
- PUBLISHES INDUSTRI VENTILATION STANDARDS
- NON-REGULATORY, N ENFORCEMENT AUTHORITY


1994–1995
Threshold Limit Values
for Chemical Substances
and Physical Agents
and
Biological Exposure Indices
ACGIH
→ THE 1970 TLV's WERE USED TO CREATE OSHA'S PELS. PELS ARE DIFFICULT TO CHANGE BECAUSE THEY ARE "LAW".

- **PUBLISHES Threshold Limit Values (TLVs)**
- **FREQUENTLY ADOPTED BY OSHA AS PEL's**

'ATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- Professional organization
- ✔ ***Certify Marine Chemists***
- Publish a wide variety of fire safety related standards


1998
Marine Chemists Directory
A Directory of NFPA Certified Marine Chemists
Including Rules for the Certification and
Recertification of Marine Chemists
(as of January 1, 1998)
NFPA
National Fire Protection Association
One Batterymarch Park, Quincy, MA 02269-9101

Responsibilities

AS PER NSTM 074 vol 3

Commanding Officer

- **Safety of ship and crew**
- **Initiate procedures/issue directives**
- **Require GFE inspections**
- **Require contractors to meet applicable laws and standards**

Dept. Heads and Divos

- Ensure provisions and procedures of NSTM 074 Vol 3 are met.
- Ensure GFE personnel conduct required inspections in areas of responsibility

Petty Officers in Charge

- Explain Possible Hazards and Precautions to Subordinates
- Enforce Safety Requirements
- Report Unsafe Conditions or Procedures
- Cease All Unsafe

Operating Personnel

- Report Unsafe Conditions, Procedures or Equipment
- Warn Endangered Personnel
- Report Injuries or Health Problems Occurring in the Course

How to Build a Gas Free Program

- ✓**Gas Free Notebook**
- ✓Staffing
- ✓Establish Procedures
- ✓Inspections
- ✓Equipment
- ✓**Training**
- ✓Documentation

Gas Free Notebook

NSTM 074 Vol 3 App.

C

A. **Gas Free Instruction*****

B. **Active Gas Free Chits**

C. **Inactive Gas Free Chits (1 yr)**

D. **Gas Free Engineering Procedural Working Guide**

E. **IDLH Space Emergency Entry Checklist**

F. **Closed Compartment**

Options:

Index w/ Serial Numbers / Audit Sheet & Comments / Inspection Checklists

Blank Gas Free Certificates / Hot Work Certificates / Opening Requests

Designation

PROGRAM ORGANIZATION

- **What bills and instructions can I consult to help me organize and administer my GFE program?**
- **Three documents**
  - **Gas Free Instruction**
  - **Toxic Gas Bill**
  - **General Emergency Bill**

GFE INSTRUCTION

- Management tool
- Details shipboard policy and responsibilities
- Justifies program
- Should be required reading

TOXIC GAS BILL

- Required by SORM

DCA's responsibility

- Covers initial actions for watchstanders in unplanned, accelerated GFE evolution

How to report, word to be passed, controlling actions

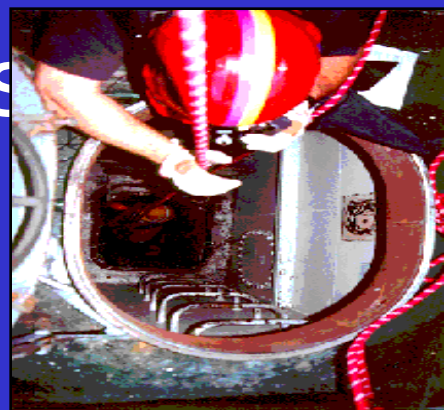
- Toxic Gas Drill MOB-D-31-SF

TRAINING

NSTM 074 Vol 3
App. B

Upon Reporting & Prior to Availabilities

- Recognizing hazards
- Identifying confined spaces and precautions regarding confined space entry
- Requesting Gas Free Services
- Helping shipmates in an emergency



ONGOING TRAINING

- Divisional GMT lectures
- POD Notes
- DC Team training
- Fire Watch
- Site TV

Any Questions???

QUESTION #1

- What are the two purposes of the Gas Free Engineering program?

❶ To ensure a safe working and living environment for the crew

❷ To provide an all hands hazard awareness training program

QUESTION #2

- **What instruction or bill outlines the requirements to be met in the event of an emergency GFE evolution?**

TOXIC GAS BILL

QUESTION #3

- **How often must All Hands receive training in Hazard Awareness?**

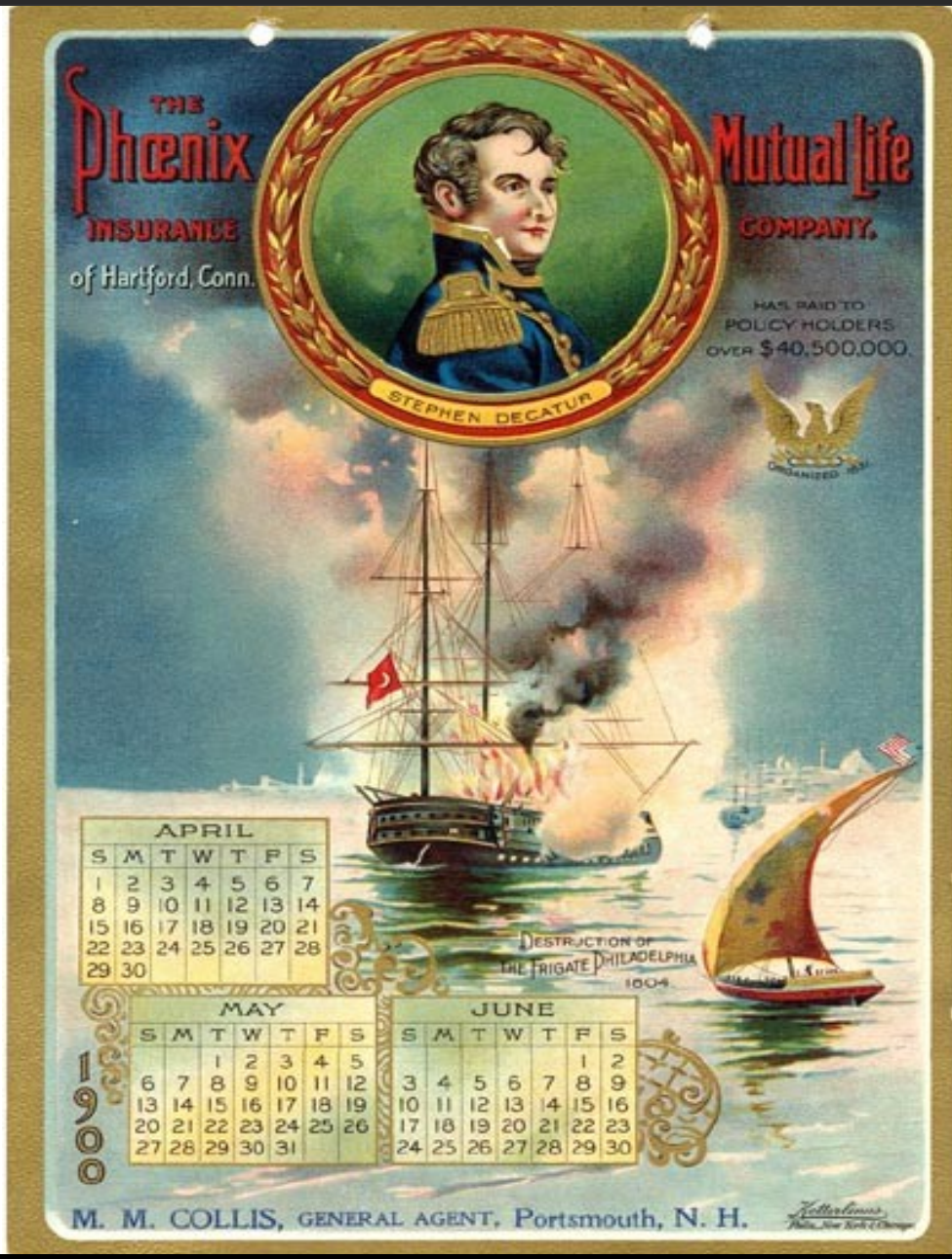
Upon reporting

Prior to Availabilities

UNIT 7
INTRODUCTION
GAS FREE
ENGINEERING

LEARN CPR

you can do it!


THE Phœnix INSURANCE of Hartford, Conn.
Mutual Life COMPANY.
HAS PAID TO POLICY HOLDERS OVER $40,500,000.
STEPHEN DECATUR
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M. M. COLLIS, GENERAL AGENT, Portsmouth, N. H.